

A NEW GENUS AND NEW SPECIES OF TREMATODE WORMS OF THE FAMILY PLAGIORCHIIDAE

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In 1927, while a student at the University of Washington, the writer collected about 10 flukes from the intestines of frogs (*Rana pretiosa*). Owing to the lack of adequate library facilities, a description of these parasites, which are regarded as representing a new genus and new species of the family Plagiorchiidae, could not be completed until the writer came to Washington, D. C. A survey of the literature has now made it possible to complete the study of these trematodes and to determine their systematic position. The writer takes pleasure in acknowledging his indebtedness to his associates in the Zoological Division of the Bureau of Animal Industry for helpful suggestions. The host determination was made by members of the staff of the Department of Zoology in the University of Washington.

HAPLOMETRANA, new genus

Generic diagnosis.—Plagiorchiinae: Slender worms, flattened dorsoventrally, and bluntly rounded at both extremities. Esophagus long and slender. Intestinal ceca long, extending from the bifurcation almost to the posterior extremity of the body. The moderately long, slender cirrus pouch extends posterior to the acetabulum and curves about it anteriorly. A saclike seminal vesicle occupies approximately the posterior half of the cirrus pouch, anterior to which are the narrow prostate duct and the ejaculatory duct. The cirrus is protrusible.

Haplometrana may be distinguished from other genera of the subfamily Plagiorchiinae by the possession of a definite combination of characters. The testes are tandem and in the median line. The ovary is approximately median in position, and a seminal receptacle is present. Neither the descending ramus nor the ascending ramus of the uterus passes between the testes. Both branches of the uterus are normally ventral to the testes, and the ascending ramus usually

passes under the ventral surfaces of the ovary and seminal receptacle. The seminal receptacle is just posterior to the ovary and nearly median. The vitellaria are lateral, occur in unorganized chains of follicles, and extend from about the level of the acetabulum posteriorly to a point about halfway between the posterior testis and the posterior end of the body.

Type species.—*Haplometrana intestinalis*, new species.

HAPLOMETRANA INTESTINALIS, new species

Description.—*Haplometrana*: Rather small, slender distomes, of somewhat variable length and width. Mature specimens are about 5 mm. long and 0.48 mm. to 0.63 mm. in maximum width; thus, the length is about eight to ten times the maximum width. There is no constriction between the anterior and posterior portions of the body (pl. 1, fig. 1). The cuticle is spinous, especially in the anterior region.

The oral sucker is about 0.256 mm. to 0.32 mm. in diameter; it is larger than the acetabulum and subterminal in position. The acetabulum is about 0.176 mm. to 0.24 mm. in diameter and is situated in the anterior sixth of the body length. The suckorial disk of the acetabulum is continued dorsally as a cone-shaped mass of muscular tissue.

The muscular pharynx is preceded by a short prepharynx. The former is 0.11 mm. to 0.14 mm. wide and 0.08 mm. to 0.10 mm. long, is nearly contiguous to the oral sucker, and is roughly one-half its size. The esophagus is long and very slender. The intestinal ceca are lateral in position, extending posteriorly from the bifurcation to a point within a short distance from the posterior tip of the body. In some specimens the ceca are of unequal length.

Since it was impossible to study the specimens in the living state, the precise structure of the excretory system can not be described. One stained specimen shows paired saclike bladders extending anteriorly beyond the intestinal bifurcation, similar to those described by Looss for *Haplometra cylindrica*. These branches of the Y reach nearly to the oral sucker. The excretory pore is terminal.

The genital pore is anterior to the acetabulum and median, or nearly median, in position. The cirrus pouch is slender and curls about the suckorial disk of the acetabulum. (Pl. 1, fig. 2.) It is found either to the left or to the right of the disk. The testes are tandem and median; they occupy all, or nearly all, the intercecal space and in some specimens are partially superimposed upon the ceca laterally. Usually the testes are separated from each other by a distance somewhat less than their diameter. The posterior margin of the posterior testis marks the approximate equator of the body. The diameter of the testes is about 0.32 mm. to 0.368 mm. In the specimens

in which the vas efferens may be traced anteriorly, the position of these ducts varies considerably. In one specimen the duct of the posterior testis passes anteriorly between the intestinal ceca and anterior testis on the left and turns transversely to the right just posterior to the transverse vitelline duct. On the right it joins the vas efferens from the anterior testis and from this point proceeds as the vas deferens to the seminal vesicle. Shortly before the cirrus pouch is reached a small sac or reservoir is formed. (Pl. 1, fig. 2.)

The seminal vesicle is bulky and rather long, occupying the posterior half of the slender cirrus pouch. Anterior to it are the narrow prostate canal, the ejaculatory duct, and the protrusible cirrus. (Pl. 1, fig. 3.)

The ovary is located immediately caudad to the posterior border of the cirrus pouch, a short distance posterior to the acetabulum, and immediately anterior to the seminal receptacle. The diameter of the ovary is about 0.22 mm. to 0.24 mm.

A rather large and definite seminal receptacle is present, anterior to the anterior testis, from which it is separated by the transverse vitelline duct, and immediately posterior to the ovary.

The uterus is extensive, filling the posterior half of the body. It extends from the termination of the short oviduct posteriorly and ventrally, under the ventral surfaces of the testes to the posterior tip of the body, and then returns anteriorly to the genital pore. Both the descending and ascending portions are coiled transversely and are folded upon themselves. The coils of the uterus are slender, except perhaps posteriorly, where no definite form is discernible. It is to be noted that the uterus passes not between the testes but under their ventral surfaces. The ascending ramus also passes ventrally beneath the seminal receptacle, ovary, and cirrus pouch.

The vitellaria are distinct follicles, disposed in lateral chains, and extend from near the posterior edge of the ovary to a point about one-fifth of the body length from the posterior tip of the body. There is no pattern or definite organization of the follicles. The juncture of the oviduct, the vitelline duct, and the duct of the seminal receptacle is variable in position, but usually these ducts unite in close proximity to the ovary and seminal receptacle. (Pl. 1, fig. 4.) Laurer's canal is present and communicates directly with the seminal receptacle. The yolk reservoir is variable in position but is located somewhere along the transverse vitelline duct and near the median line.

The fully formed eggs are brownish yellow and about 0.048 mm. to 0.058 mm. long and 0.018 mm. to 0.026 mm. wide. Those observed in the initial portion of the descending ramus are transparent and colorless.

Host.—*Rana pretiosa*.

Location.—Intestine.

Locality.—United States (Bothell, Wash.)

Type specimen.—U.S.N.M. Helm. Coll. No. 29903; paratypes, U.S.N.M. Helm. Coll. No. 29904.

SYSTEMATIC POSITION OF HAPLOMETRANA INTESTINALIS

The family Plagiorchiidae Lühe, 1901, has been frequently subdivided and revised by various parasitologists. The most recent revision, and one that is based upon extensive studies pertaining to many of the genera concerned, is that of Travassos (1928). His six subfamilies represent a conciliation of his own studies and views with those of Baer (1924) and Poche (1926), and are as follows: Plagiorchiinae Pratt, 1902; Brachycoeliinae Looss, 1900; Saphaedrinae Baer, 1924; Reniferinae Pratt, 1902; Prosthogoniminae Lühe, 1909; and Opisthogoniminae Travassos, 1928.

Travassos evidently prefers to accept Pratt's (1902) diagnosis of the subfamily Plagiorchiinae rather than that of Looss (1899), which was accepted by Baer (1924). The former allows somewhat greater latitude, and 22 genera are placed in this group by Travassos. Pratt's key was devised to include only North American forms; however, from a study of it the following diagnosis may be given:

Subfamily PLAGIORCHIINAE Pratt, 1902

Subfamily diagnosis.—Plagiorchiidae: Hermaphroditic distomes in which the acetabulum is median and ventral. The ovary is anterior to the testes. The uterus usually extends posterior to the testes and usually reaches the posterior end of the body. The intestinal ceca are long, extending more than one-half the body length. The ovary is usually located immediately behind the acetabulum or beside it. The genital pore is near the acetabulum or in front of it. There are no papillae or projections surrounding the oral aperture. The intestinal ceca usually do not reach the posterior end of the body. The cuticle is usually spiny. The excretory canal or bladder is usually Y shaped. A cirrus sac is present. The esophagus is long or lacking. The cirrus pouch extends posteriorly to, or beyond, the acetabulum. The extent of the vitellaria is variable. The position of the testes with relation to each other is variable.

With reference to the characters of the Plagiorchiinae, agreement seems to be general upon one point, namely, that the subfamily displays the typical anatomy of the family. The remaining subfamilies possess more or less distinct, divergent characters.

The writer has reviewed descriptions and illustrations pertaining to the 22 genera credited to the subfamily Plagiorchiinae by Travassos, particularly with reference to the 9 genera comprising the "A"

group, which most typically represent it, in the opinion of Travassos. Of all these genera, *Haplometra* as defined by Odhner, is most closely related to the proposed new genus *Haplometrana*: on the basis of the existing generic conceptions within the subfamily, the creation of a new genus for the new species from *Rana pretiosa* is justified and necessary.

The fact that some of the genera of Plagiorchiinae are extremely closely related morphologically is generally recognized. The characters that distinguish the earlier genera, especially those of Looss, Lühe, and Odhner, should, it is believed, be accepted for the present as a guide, at least until the need for an adequate revision of the group is fulfilled.

The writer believes that the validity of the proposed new genus *Haplometrana* depends only upon the demonstration of its distinction from *Haplometra*; for, as will be shown, the latter genus shares with *Haplometrana*, to a degree, certain characters that distinguish both from all other genera of the subfamily.

According to Odhner (1911), Looss concluded that the tandem position of the testes in *Haplometra cylindrica* Looss was to be regarded as an abnormality, and the oblique position stands in his generic diagnosis. Looss also states that the uterus passes between the testes. On the basis of observations upon some 30 specimens of *Haplometra cylindrica*, Odhner (1911) maintains that the tandem position of the testes must be regarded as normal for this genus, and he points out emphatically that the uterus does not pass between the testes but under them. That Odhner's observations are correct is supported by a recent publication of Travassos (1930), who describes specific variations of *Haplometra cylindrica*. Odhner regards *Haplometra* as related to, and derived from, *Lepoderma* (synonym of *Plagiorchis*). He concludes that the modifications that *Haplometra* exhibits follow as a natural result of its topography. He therefore regards these features, which must be admitted as atypical for the subfamily, as comprising a basis entirely adequate for the validity of the genus.

In *Haplometrana intestinalis*, owing to the still greater diameter of the testes as compared with the body width, a tandem and median position of the testes becomes the only possibility. As a result of this morphological feature, the passage of the uterus between the testes is rendered a physical impossibility. Dorsoventral passage of the uterus between the testes is a theoretical possibility but has not been observed. The new generic conception is based essentially upon these facts.

If Odhner's emended concept of the genus *Haplometra* is accepted, *Haplometrana* is distinguished from *Haplometra* principally by the possession of a definite seminal receptacle. Moreover, in *Haplo-*

metrana the vitellaria do not extend anterior to the acetabulum. The uterus is transversely coiled and narrow. The intestinal ceca do not extend to the posterior tip of the body. If the original diagnosis of Looss (1899) is accepted, the distinction between the two genera is even more marked.

The genus *Opisthioglyphe* Looss also exhibits an aberrant morphology, in that the uterus does not pass between the testes. In this genus, however, the uterus is confined to the space between the acetabulum and the middle of the anterior testis. The testes are usually oblique but may be tandem, and they are usually located well back in the posterior portion of the body. Typically, the cirrus pouch is entirely, or mostly, anterior to the acetabulum. The vitellaria extend to the posterior tip of the body.

Concerning the separation of the testes by the uterus in the genus *Mediorima* Nicoll, 1914, no definite statement can be made, since this genus is inadequately described. Travassos includes it in the Plagiorchiinae. Sumwalt (1926) expresses the opinion that the establishment of the genus *Mediorima* seems unnecessary. *Mediorima* appears to be so closely related to *Zeugorhis* Stafford, 1905, and *Lechriorhis* Stafford, 1905, both of which belong to the subfamily Reniferinae Pratt, 1902, that its inclusion in the Plagiorchiinae appears dubious.

BIBLIOGRAPHY

BAER, JEAN G.

1924. Description of a new genus of Lepodermatidae (Trematoda) with a systematic essay on the family. *Parasitology*, vol. 16, no. 1, pp. 22-31, figs. 1-2, Jan.

BHALERAO, G. D.

1926. On the trematode parasites of a water-snake, *Tropidonotus piscator*. *Parasitology*, vol. 18, no. 1, pp. 4-13, figs. 1-2, Jan.
1926. On the trematodes of the digestive tract of a common Indian frog, *Rana tigrina*, with a description of *Centroritus pentadelphii* n. g., n. sp. *Parasitology*, vol. 18, no. 2, pp. 154-159, figs. 1-1A, June.

CORT, W. W.

1919. A new distome from *Rana aurora*. *Univ. California Publ. Zool.*, vol. 19, no. 8, pp. 283-298, figs. 1-5, Nov. 15.

LOOSS, A.

1894. Die Distomen unserer Fische und Frösche. Neue Untersuchungen über Bau und Entwicklung des Distomenkörpers. 296 pp., 9 pls., 192 figs. Stuttgart. (Biblioth. zool., Heft 16.)
1899. Weitere Beiträge zur Kenntniss der Trematoden-Fauna Aegyptens, zugleich Versuch einer natürlichen Gliederung des Genus *Distomum* Retzius. *Zool. Jahrb., Abt. f. Syst.*, vol. 12, nos. 5-6, pp. 521-784, figs. a-b, pls. 24-32, figs. 1-90. Dec. 28.
1902. Ueber neue und bekannte Trematoden aus Seeschildkröten. Nebst Erweiterungen zur Systematik und Nomenclatur. *Zool. Jahrb., Abt. f. Syst.*, vol. 16, nos. 3-6, pp. 441-894, figs. A-B, pls. 21-32, figs. 1-181, Nov. 24.

LÜHE, MAX.

1909. Parasitische Plattwürmer. 1: Trematodes. Süßwasserfauna Deutschlands (Brauer). Heft 17, 217 pp., 188 figs.

MEHRA, H. R., and NEGI, P. S.

1926. On a new trematode *Tremiorchis ranarum* nov. gen., nov. spec., from the common Indian frog *Rana tigrina*. Parasitology, vol. 18, no. 2, pp. 168-181, figs. 1-9, June.

NICOLL, WILLIAM.

1911. On three new trematodes from reptiles. Proc. Zool. Soc. London, 1911, pp. 677-686, pls. 27-28, figs. 1-10, Sept.

1912. On two new trematode parasites from the Indian cobra. Proc. Zool. Soc. London, 1912, pp. 851-856, fig. 122, Dec.

1914. The trematode parasites of North Queensland. 1. Parasitology, vol. 6, no. 4, pp. 333-350, pls. 23-24, figs. 1-9, Jan. 31.

1914. Trematode parasites from animals dying in the Zoological Society's gardens during 1911-1912. Proc. Zool. Soc. London, 1914, pp. 139-154, pls. 1-4, figs. 1-11, Mar.

1926. A reference list of the trematode parasites of British amphibia. Parasitology, vol. 18, no. 1, pp. 14-20, Jan. 22.

ODHNER, TEODOR.

1911. Nordostafrikanische Trematoden, grösstenteils vom Weissen Nil (von der schwedischen zoologischen Expedition gesammelt). 166 pp., 14 figs., 6 pls. Uppsala. (Results of the Swedish Zoological Expedition to Egypt and the White Nile, 1901, under the direction of L. A. Jägerskiöld, pt. 4.)

POCHE, FRANZ.

1926. Das System der *Platodaria*. Arch. f. Naturg., Abt. A, vol. 91, no. 2, pp. 1-240, figs. 1-5, pls. 1-3, figs. 1-95, Jan.; no. 3, pp. 241-458, figs. 7-16, pls. 4-7, figs. 96-126, Mar.

PRATT, H. S.

1902. Synopsis of North American invertebrates. 12. The trematodes. Part 2. The Aspidocotylea and the Malacocotylea, or digenetic forms. Amer. Nat., vol. 36, pp. 887-910, Nov.; pp. 953-379, 8 pls., figs. 1-30, Dec.

SUMWALT, MARGARET.

1926. Trematode infestation of the snakes of San Juan Island, Puget Sound. Washington Univ. Studies, sci. ser., vol. 13, no. 2, pp. 73-101, pls. 1-4, figs. 1-10.

TRAVASSOS, LAURO.

1928. Fauna helminthologica de Matta Grosso (Trematodeos, I parte). Mem. Inst. Oswaldo Cruz, vol. 21, no. 2, pp. 309-341, pls. 42-54; French version, pp. 343-372.

1930. Pesquisas helminthologicas realizadas em Hamburgo. I. Genero *Haplometra* Looss, 1899 (Trematoda: Plagiorchiidae). Mem. Inst. Oswaldo Cruz, vol. 23, no. 4, pp. 163-168, pls. 27-37, figs. 1-30, Apr.

1930. Pesquisas helminthologicas realizadas em Hamburgo. IV. Notas sobre o genero *Opisthioglyphe* Looss, 1899 e generos proximos. Mem. Inst. Oswaldo Cruz, vol. 24, no. 1, pp. 1-17, pls. 1-7, figs. 1-29, Aug.

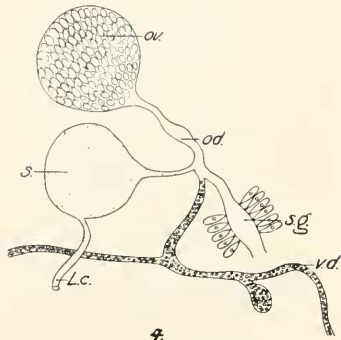
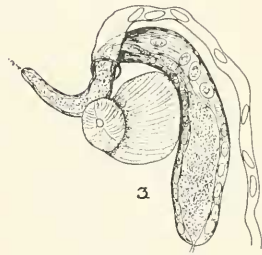
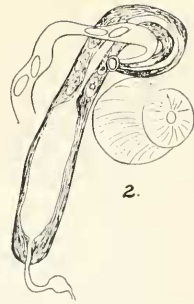
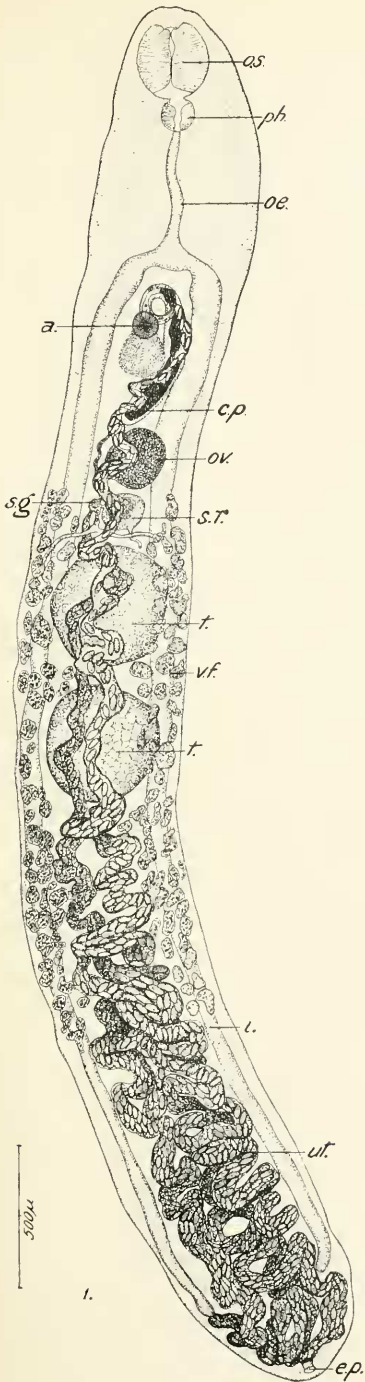
WARD, H. B., and WHIPPLE, G. C.

1918. Fresh-water biology. 1,111 pp., 1,547 figs. New York.

EXPLANATION OF PLATE 1

FIGURE 1. Camera lucida drawing of ventral view of a stained specimen: *o. s.*, Oral sucker; *ph.*, pharynx; *oe.*, esophagus; *a.*, acetabulum; *c. p.*, cirrus pouch; *ov.*, ovary; *s. r.* seminal receptacle; *s. g.*, shell gland; *t.*, testis; *v. f.*, vitelline follicle; *i.*, intestine; *ut.*, uterus; *e. p.*, excretory pore.

2. Normal position of the cirrus pouch and end ducts of the reproductive system.
3. Cirrus pouch showing the cirrus protruding from the genital pore.
4. Diagrammatic representation of the relationships of the female reproductive organs: *ov.*, ovary; *o. d.*, oviduct; *s.*, seminal receptacle; *L. c.*, Laurer's canal; *v. d.*, transverse vitelline duct; *s. g.*, shell gland.



HAPLOMETRANA INTESTINALIS, NEW GENUS, NEW SPECIES

FOR EXPLANATION OF PLATE SEE PAGE 8